Characteristics of coconut oil blended with sunflower oil and mustard oil

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Abstract

The studies suggested that balanced oil can be formed by suitably blending CNO with other PUFA or MUFA oils so that it can contain all essential components required for the human health.

Keywords: Coconut, sunflower, mustard, blend oil

Introduction

Blended oils are gaining popularity worldwide due to advantages they offer such as improved thermal stability, oxidative stability, nutritional benefits and an ability to tailor the desired properties. Most importantly, they are cheaper alternatives or substitutes to pure vegetable oils. A comparison of the absorption of oil by chick pea (*Cicer arietium*) dal fried in groundnut, cottonseed, rapeseed and their blends has shown that the absorption of cottonseed oil is minimal. Lower peroxide values were reported in stored food items which were fried in rapeseed-cottonseed blends compared to those fried in groundnut-cottonseed and groundnutrapeseed oil blends (Mehta *et al.*, 1986). The blends of 50% palm kernel oil with 50% coconut oil were suitable, if crude oils with a coconut flavor were desired (Lee and Timms, 1988). A blend of marine and vegetable oils (1:3) has been used for frying, baking or for the preparation of margarines without the development of a fishy odor (Freeman *et al.*, 1988). The pattern of oil uptake constituents during the frying of dehydrated potato chips has been reported.. Premavalli *et al.*(1998) investigated the storage and thermal stabilities of refined cottonseed oil-mustard seed oil blends (80:20). Comparative studies on physical properties of vegetables oils and their blends after frying indicated a minimization in peroxide value using blended oils (Susheelamma *et al.*, 2002). The present study was aimed at exploring the characteristics of coconut oil blended with sunflower oil and coconut oil blended with mustard oil in different proportions and the variations in their shelf life.

Materials and methods

Coconut oil was blended with refined sunflower oil which comes under the group of Poly unsaturated fatty acid (PUFA) in the ratio of 25:75, 50:50, and 75:25 (by volume) and kept for storage for different periods.. The same way coconut oil was blended with refined mustard oil which comes under MUFA category in the 25:75, 50:50, and 75:25 proportions (by volume)

and kept for storage studies. All the oil samples were kept at room temperature (302°C) in amber colored bottles (capacity 750 ml). The oil samples were analyzed for acid value, peroxide value, iodine value, refractive index and specific gravity (AOAC 1970). Fatty acids of triglycerides were analyzed by preparing methyl esters according to a conventional procedure consisting of saponification followed by acidification and finally methylation using diazomethane (Bandyopadhyay and Gholap 1973). Gas chromatographic (GC) analysis of fatty acid methyl esters was carried out using a NUCON SERIES 5700 of data station 0-2.5 mV range and < 1.5s response rate. A 2m x 2 mm stainless steel 10% Silar 7C column packed with 60-120 mesh Gas Chrom Q was used. The injector and detector temperatures were maintained at 240°C. The column temperature was set at 160°C for 5 min and then ramped at a rate of 5°C per min to a final temperature of 220°C and kept there for 20 min. The total time for analysis was 37 min. Fatty acids were tentatively identified by comparison with retention times of authentic reference samples.

Results and discussion

In the present work coconut oil was blended separately with mustard oil and sunflower oil in different proportions. The refractive index and specific gravity at room temperature (30±2°C) for pure coconut oil, mustard oil and sunflower oil before blending were given in Table 1. These values have changed negligibly after blending. All the samples were kept in a cooling chamber to study the changes in the freezing point. The freezing point of pure CNO was 23.5°C and that of Mustard oil was 15°C and that of SFO was 10°C. The blended oils show different freezing point with proportionate decrease in freezing point from pure CNO to pure SFO or pure CNO to pure MO. The freezing point of 25% CNO+75% SFO was 21°C and the freezing point of 75% CNO+25% SFO was 14°C. Similar was the case of oils blended with CNO and MO.

In order to assess the shelf life of the blended oils the quality analysis was done with 15 days interval up to three and half months (Table 2). It was seen that the free fatty acid levels of pure CNO, pure MO, pure SFO and their blended samples did not change considerably over a period of 3 months. This is also positive information to entrepreneurs who want to promote blended oils.

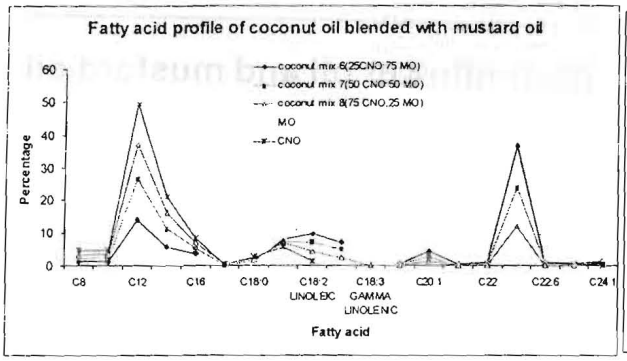

Fig. 1.

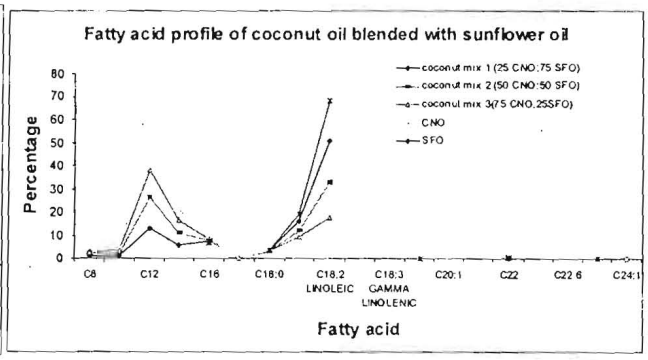

Fig. 2.

Table 1 Refractive index and specific gravity of oils

Characters	Coconut oil	Mustard oil	Sunflower oil
Refractive index	1.4478	1.4650	1.4640
Specific gravity	0.925	0.910	0.0.918

Table 2 Free fatty acids (FFA)

Treatment	sample 1 (Fresh)	sample 2 (15 days)	sample 3 (30 days)	sample 4 (45 days)	sample 5 (60 days)	sample 6 (75 days)	sample 7 (90 days)	Sample 8 (105 days)
25%CNO+75%SFO	0.65	0.52	0.54	0.51	0.56	0.56	0.54	0.59
50%CNO+50%SFO	0.77	0.79	0.78	0.77	0.77	0.64	0.74	0.87
75%CNO+25%SFO	0.90	0.95	0.95	0.83	0.87	0.82	0.77	1.11
100%CNO	1.05	1.15	1.07	0.99	1.17	1.00	1.06	1.30
100%SFO	0.11	0.08	0.09	0.07	0.06	0.08	0.09	0.09
75%MO+25%CNO	0.79	0.70	0.74	0.67	0.80	0.74	0.78	0.86
50%MO+50%CNO	0.87	0.76	0.87	0.76	0.79	0.74	0.92	1.01
25%MO+75%CNO	0.94	0.97	0.91	0.81	0.99	0.93	1.09	1.19
100%MO	0.69	0.58	0.61	1.11	0.60	0.55	0.69	0.80

*Values are mean of two replications; **Observations made at fortnightly interval

1 Sunflower oil (treatment 5) and mustard oil (T_8) which are refined, bleached and premium branded oils have the lower FFA compared to ordinary sample of coconut oil.

2. The oils when blended, give values nearly proportional to the ratio of their mixture

The fatty acid profile of pure oils and blended oils were studied (Fig.1 and 2). The oils when blended, give values nearly proportional to the ratio of their mixture. C12 (lauric acid) was maximum available in pure CNO (50%) and decreased almost proportionally from combinations of 75% CNO+25% MO to 50%CNO+ 50% MO to 25% CNO+ 75% MO with the values 38%, 27% and 13% respectively. Combinations of CNO and SFO also behaved similarly. Another observation was regarding the availability of essential fatty acids C18.2 (Linoleic acid) and C18.3 (Linoleinic acid). SFO contains 68% of C18.2 and the combination of 75% SFO and 25% CNO contains 52% of C18.2 whereas pure CNO contains 1.44% of C18.2. Similarly in the MO, percentage of C12 (lauric acid) was nil but in the combination of MO and coconut oil, it is available proportionately. The same case was reported with C18.3 (Linoleinic acid) also. The MO contains 11.5% of C18.3 and the CNO does not have that. But when CNO was blended with MO in the ratio of 50 : 50 the percentage of C18.3 was increased to 5.1. C18.2 is also known as omega 3 fatty acid and C18.3 as omega 6 fatty acid. These are essential fats because the body cannot synthesize them from any other substance we eat, so a direct food source is required. C12 lauric acid is also an important fatty acid and monolaurin, the derivative from lauric acid is claimed to be ante bacterial, ante fungal, anti protozoal and even can be used to cure aids.

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